PRODUCT AND TECHNOLOGY NEWS FROM FUTURE ELECTRONICS

# FTM

SEPTEMBER 2014
AMERICAS' EDITION

## APPLICATION SPOTLIGHT:
# INDUSTRIAL AND HOME AUTOMATION

**Microsemi**
AcuEdge™ Technology for the Connected Home
PAGE 4

**Microchip**
Protect the Data in Your Low Power Application
PAGE 5

**Micrel**
Integrate Your Power Solution into a Single QFN Package
PAGE 17

**Harting**
They Have Your Solution: DIN 41 612 Connectors
PAGE 21

Get an ISL854xDEMO1Z Board or ISL85003xDEMO1Z for just a **PENNY** and be automatically entered to **WIN** a Li-ion Drill/Driver from Intersil! *See details on page 6*

Register to qualify to receive **FREE** WAGO samples for all your compact control applications. *See details on page 12*

FUTURE ELECTRONICS

# TABLE OF CONTENTS


| | | |
|---|---|---|
| **APPLICATION SPOTLIGHT** | | |
| Renesas | Real-Time Industrial Networking Begins with R-IN | 3 |
| Microsemi | AcuEdge™ Technology for the Connected Home | 4 |
| Microchip | Protect the Data in Your Low Power Application | 5 |
| Intersil | Robust ISL8541x Sync Buck Regulators Ideal for Industrial Applications with 3V to 36V Wide Input Range | 6 |
| Vishay | Phototriacs: Home Applications | 7 |
| International Rectifier | Expansion of 60V StrongIRFET™ Power MOSFET Family | 8 |
| Panasonic | The Latest in Panasonic Semiconductors | 9 |
| Yageo | High Voltage Ceramic Capacitors for Industrial Automation | 10 |
| TE Connectivity | New Power Triple Lock (PTL) Connector | 11 |
| **COMPONENT FOCUS** | | |
| TE Connectivity | Scalable Spring Fingers for Wearables and PCB Applications | 12 |
| WAGO | Small is Big – Surface Mount PCB Terminal Block | 12 |
| NXP | PCA9955A 16-Channel Fm+ $I^2C$-Bus 57mA/20V Constant Current LED Driver | 13 |
| Renesas | Work Less. Create More. Micrium RTOS and Middleware Modules, Bundled with Renesas MCUs | 14 |
| Exar | Universal PMIC Family – Programmable Power Solution for Any FPGA or SOC | 16 |
| Micrel | Integrate Your Power Solution into a Single QFN Package | 17 |
| CUI Inc. | Latest AC/DC Power Supplies Boost Power and Efficiency in Compact Footprint | 18 |
| CUI Inc. | Powering Your Next Design | 18 |
| TE Connectivity | Connect with Confidence with Economy Power (EP) II Connectors | 19 |
| SL Power | Solves Test & Measurement Power Challenges with TU425 AC/DC Power Supply Family | 20 |
| TE Connectivity | Control the Signal You Send | 20 |
| Harting | We Have Your Solution – DIN 41 612 Connectors | 21 |
| Susumu | 0.01%, 2ppm (TCR) and Unmatched Reliability | 22 |
| E-Switch | Offers Switch Solutions for Home and Industrial Automation Products | 22 |
| NKK Switches | Combat Harsh Environments with Rugged Toggle Switches | 23 |
| NKK Switches | Offers a Full Range of Switch Devices for Your Toughest Environments | 23 |
| Future Electronics | Analog Corner | 26-27 |
| Semtech | LoRa™ Enables the Internet of Things® | 28 |
| **DESIGN NOTE** | | |
| Macronix and NXP | Quad SPI Flash: A Simpler, Faster Alternative to Standard SPI Flash When Adding External Memory to 32-bit MCU Systems | 24-25 |
| **ADS** | | |
| Future Electronics | New Online FTM – Same Great Content | 10 |
| Future Electronics | Just Because We're Big Doesn't Mean We Aren't Flexible | 15 |


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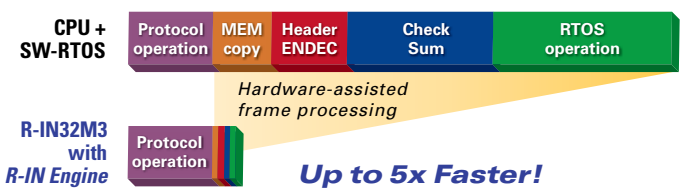
# Real-time industrial networking begins with R-IN

The growing demand to network industrial systems and processes to improve operational efficiencies and reduce cost, has driven the use of Ethernet-based protocols such as EtherCAT®, CC-Link® IE, PROFINET®, Ethernet/IP™, Modbus® TCP and others. The challenge is in designing a cost-effective platform to support these multiple protocols, as well as integrate a highly-efficient processor subsystem to manage complex real-time operation. Renesas facilitates this system-level need with the R-IN32M3 multi-protocol industrial networking platform application-specific standard product (ASSP).

Renesas R-IN

Customers integrating the R-IN32M3 into their devices can achieve up to a 5X improvement** in overall network performance using optimized hardware accelerators targeted at reducing packet handling overhead and RTOS management.

**Accelerate Network Frame Handling with the *R-IN Engine***




## Key Features

- ARM® Cortex™ M3 CPU at 100MHz
- Hardware accelerators significantly offload from the main CPU
  - Hardware Real-time OS Accelerator (HW-RTOS)
  - Hardware Ethernet Accelerators (IP/TCP/UDP Check Sum, Header ENDEC, Buffer manager)
- 1.3M bytes of on-chip RAM
- Dual-channel 10/100 Ethernet (with dual-channel PHY included*)
- EtherCAT or CC-Link IE slave controller on-chip (license free)
- 2-port real-time Gigabit switch, supports cut-through and store & forward operating modes, as well as support for IEEE1588 PTP and Device-Level-Ring (DLR) protocols
- High-speed, real-time port with dedicated DMAC
- Many peripherals and GPIOs
- Supports multiple protocols including:

EtherCAT. CC-Link PROFINET EtherNet/IP Modbus CANopen

*Dual channel PHY is included on the R-IN32M3-EC version only. **Average result measuring UDP throughput compared to ARM Cortex M3 MCU.

**For more information or to buy products, go to bit.ly/RenesasR-IN32**

## R-IN32M3 Series ASSP

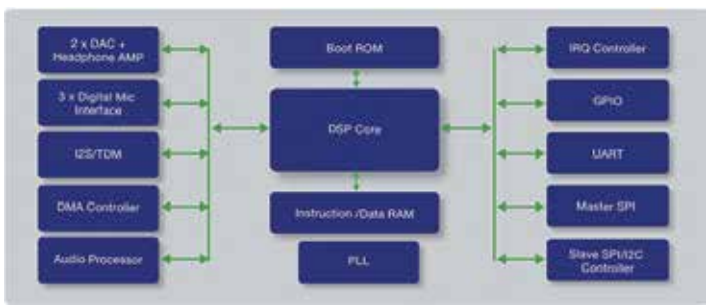
RENESAS

# Microsemi AcuEdge™ Technology for the Connected Home

**New high performance audio processors enable the streamlined development of connected home voice capabilities.**

Designed to support advanced acoustic echo canceller and noise reduction for connected home applications, it enables the full duplex operation for seamless HD voice communication.

Microsemi's new audio processor features the Timberwolf platform with innovative AcuEdge technology, which is a set of highly complex and integrated algorithms that allow the system to extract intelligible information from the audio environment to deliver clear communication.



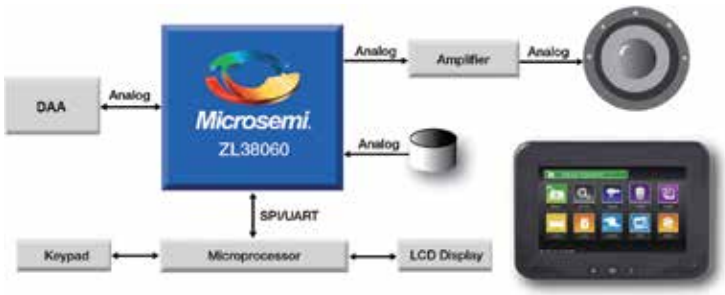

ZL38060 Block Diagram

### Audio Processor for the Connected Home

Microsemi's AcuEdge Technology integrates industry leading features and dedicated firmware to deliver high-quality hands-free voice performance while reducing system design complexity.

In complex noise environments such as gaming rooms, hallways with glass panels, and building lobbies, Microsemi's AcuEdge Technology cancels echo, maintains a constant ambient noise (comfort noise) and converges during double-talk situations. While most solutions deliver only half-duplex operation, Microsemi's proprietary algorithm is able to continuously converge and track changes in the echo path to support full duplex operation.

The connected home is about enabling users to talk to each other through connected devices. Connected devices could include integrated smart home gateway, intercom, media center, IP camera, and Skype. Microsemi AcuEdge Technology enables the full duplex operation between the connected devices to deliver on seamless high definition (HD) voice communication.




Connected Home Block Diagram

## FEATURES

- DSP with voice specific hardware accelerators
- Dual ΔΣ DACs with output sampling up to 48KHz with 16Ω headphone drivers
- Single digital microphone input supporting up to 2 microphones
- Two TDM ports shared between PCM and Inter-IC sound ($I^2S$)
- $I^2C$ and SPI slave port for host processor interface
- Master SPI ports for Flash interface
- 14 GPIO pins
- Works with MiTuner™ through UART port
- Ultra low power stand-by mode
- Full duplex AEC (narrowband and wideband)
- Long tail echo cancellation (up to 256ms)
- 44.1/48kHz stereo music playback with voice
- Advanced noise reduction to reduce background noise from the near-end speech signal
- G.168 line echo canceller
- Telephone signal detection and generation
- Call progress tone detection
- 16/22 band equalizer
- Howling cancellation - prevents oscillation in echo canceller audio path

## APPLICATIONS

Connected home applications such as:

- Intercom
- Security system
- Integrated smart home gateway

To buy products or download data, go to **www.FutureElectronics.com/FTM**

## Getting Ready

Go to **www.FutureElectronics.com/FTM** and connect to the Resources to explore:

### Microsemi AcuEdge Technology

- ZL38060 Advanced Audio Processor

### MiTuner Automatic Tuning Kit

- MiTuner Information
- MiTuner GUI Software Guide
- ZLS38508 MiTuner GUI

# Protect the Data in Your Low Power Application

## *New PIC24F Family with eXtreme Low Power and Hardware Crypto Engine*


## Summary

With the Internet of Things growing at a rapid rate, protecting embedded data and extending battery life are not an option, but a necessity. Devices in Microchip's new PIC24F "GB2" family are the first PIC® MCUs to offer an integrated hardware crypto engine along with eXtreme low power (XLP) performance. This new family also features a True Random Number Generator (RNG) and One-Time-Programmable (OTP) key storage for protecting data in embedded applications. For connectivity, the "GB2" family integrates USB for device or host connections as well as a UART with ISO7816 support, which is helpful for smart card applications.

## Key Features

### Cryptographic Engine

- AES engine with 128, 192 or 256-bit key
- DES/Triple DES (TDES) engine
- True Random Number Generator (RNG)
- The One-Time-Programmable (OTP) memory includes 512-bits for secure key storage

### eXtreme Low Power Features

- 18nA sleep, 180µA/MHz run
- Enables integrity of data without sacrificing power consumption
- $V_{BAT}$ allows the device to transition to a backup battery

### Connection to USB or Wireless Protocols

- Integrated USB 2.0 device, host, OTG
- Easy connection to certified modules for Wi-Fi®, ZigBee®, Sub-GHz and Bluetooth® Low Energy

## Target Applications

### Industrial

- Security door locks
- Access control systems
- Security cameras
- POS terminals
- Smart card readers
- Heat/gas meters
- IoT sensor nodes

### Computer

- PC peripherals
- Printers
- Portable accessories

### Medical/Fitness

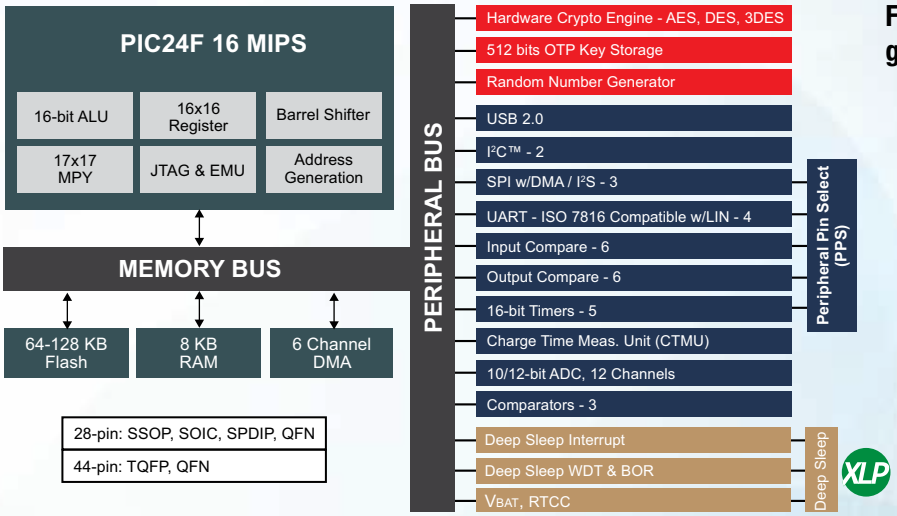
- Pedometers
- Wearable fitness
- Handheld devices

## Featured Products

| Part # | Flash | Pins | Package |
|---|---|---|---|
| **PIC24FJ128GB204** | 128KB | 44 | TQFP, QFN |
| **PIC24FJ128GB202** | 128KB | 28 | SOIC, SSOP, QFN, SPDIP |
| **PIC24FJ64GB204** | 64KB | 44 | TQFP, QFN |
| **PIC24FJ64GB202** | 64KB | 28 | SOIC, SSOP, QFN, SPDIP |

## Development Tools

- Explorer 16 Development Board (DM240001)
- PIC24FJ128GB204 Plug-In Module – USB (MA240037)
- USB PICtail™ Plus Daughter Board (AC164131)
- Smart Card/SIM Card PICtail Daughter Board (AC164141)
- RN4020 Bluetooth Low Energy PICtail/PICtail Plus (RN-4020-PICTAIL)
- Wi-Fi PICtail Daughter Board (RN-171-PICtail)
- 802.15.4/ZigBee MRF24J40MA PICtail Plus (AC164134-1)
- Sub-GHz MRF89XAM8A PICtail Plus (AC164138-1)




**For more information or to buy products, go to www.FutureElectronics.com/FTM**

MICROCHIP

# Robust ISL8541x Sync Buck Regulators Ideal for Industrial Applications with 3V to 36V Wide Input Range

**With industry leading technology in power management and analog products, Intersil provides innovative design solutions to maximize performance and reliability across a broad range of industrial applications including the smart home and smart grid, test and measurement systems, medical devices and factory automation. Programmable logic controllers, distributed control systems, smart transmitters and general purpose data acquisition processes utilize sensors and feedback mechanisms to monitor and control system interactions by collecting, storing and analyzing data.**

Intersil offers a comprehensive portfolio of highly integrated and efficient digital and analog controllers, power modules and switching regulators that simplify design and integration for power designers seeking solutions for the most complex systems.

Some of the key requirements of today's power management solutions include less power consumption under various load conditions, less space, high reliability and wide input voltage. These requirements are driving the need for highly efficient, wide $V_{IN}$, low quiescent current ($I_Q$) switching regulators in a broad range of applications. Intersil's ISL8541x buck regulators efficiently down convert the DC voltage from a power supply or battery to power multiple microprocessors and board components, at various voltage requirements. This helps minimize power loss.

The ISL85410/15/18 offer designers maximum flexibility, operating over a wide range of input and output voltages. Since the devices are pin-to-pin compatible in a 4 x 3mm package, a single layout can be leveraged across multiple systems, thus accelerating time to market and reducing design cost. The ISL85412/13 are also pin-compatible in a 3 x 3mm package.

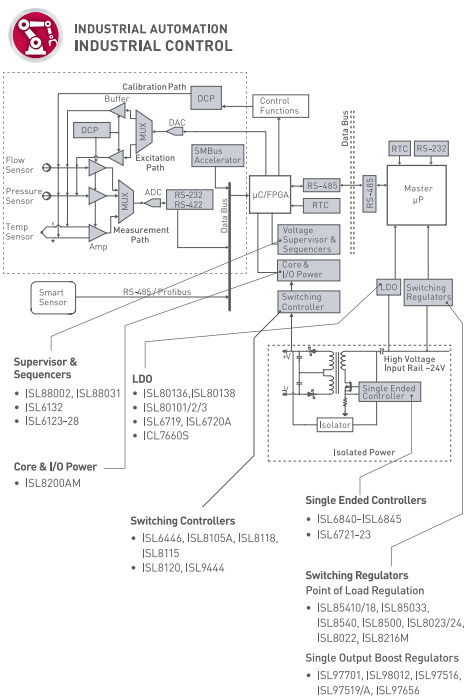
## FEATURES

- Wide input range from 3V to 36V
  - From low voltage to high voltage
  - Output range is also wide, 0.6V to 0.95 of $V_{IN}$
- Synchronous Buck Regulator with both high side and low side FETs integrated
  - Majority of competitors use a standard buck which will need an external low side diode
  - Savings in space, BOM cost and improves efficiency
- Pin-to-pin 500mA (ISL85415), 800mA (ISL85418) and 1A (ISL85410) parts
  - Can interchange depending on the final current needs for the board (ISL85418/15/10)
- Pin-to-pin 150mA (ISL85412) and 300mA (ISL85413) parts
  - Can interchange depending on the final current needs for the board (ISL85412/13)
- 3A parts (ISL85003/A) with external sync or adjustable soft start option
- Internal compensation
  - Internal compensation requires fewer external components. If you need to fine tune the performance, then using external compensation is an option.
  - Savings in board space and BOM cost
- Simple and easy-to-use
  - Intersil demo boards provide a full design that is almost complete
  - Compact, optimized design; not weighed down by extraneous bells and whistles
- Light load efficiency mode
  - Improves performance in low load conditions
  - Fast transition from PFM to PWM mode allows for excellent transient performance

**For more information or to PURCHASE products, go to www.FutureElectronics.com/FTM**

## APPLICATIONS

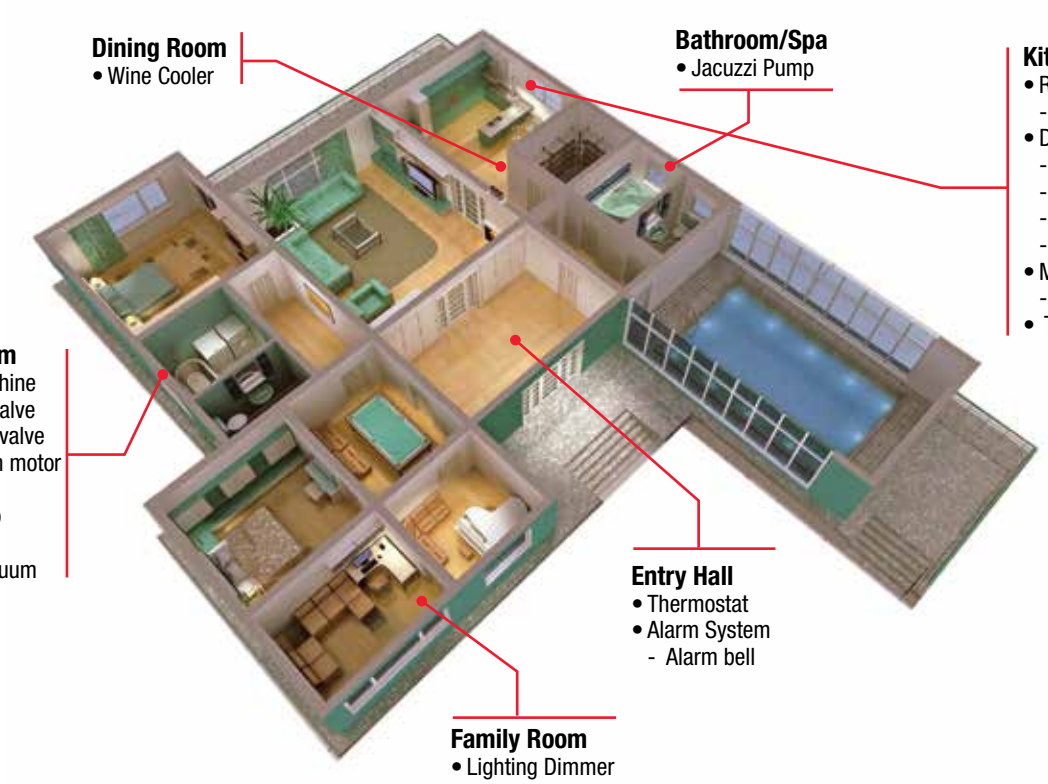
- Industrial control
- Portable instrumentation
- Distributed power supplies
- Medical devices
- Cloud infrastructure




***Purchase an ISL854xDEM01Z Board or an ISL85003xDEM01Z for only a PENNY! (plus S&H). You'll qualify to WIN a Li-ion Drill/Driver with Intersil's HIP2103 & ISL28006 parts inside!**

* All customers who purchase either DEMO board will automatically be entered to win the Li-ion Drill/Driver. Limited time offer - act fast while supplies last!

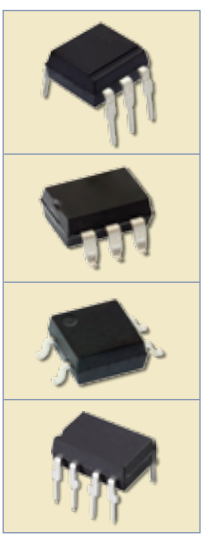
# Phototriacs: Home Applications




Phototriacs are used as a switch for AC loads and as a pre-driver for larger TRIACs or silicon controlled rectifiers. As a subcategory of optocouplers, they protect sensitive, low voltage control electronics from higher voltage transients or spikes. And, they are found everywhere in your house or apartment.

Phototriacs are either zero crossing or non-zero crossing. Vishay has an extensive portfolio of each type with a select few shown in the table below. In addition, Vishay also offers the VO2223 Power Phototriac which features a phototriac driving a TRIAC with output currents of 0.9A and 1.0A.

| Crossing | Part Number | Package | $I_{FT}$ (mA) | dV/dt min (V/µs) | $V_{ISO}$ ($V_{RMS}$) | $V_{DRM}$ (V) | Operating Temperature (°C) |
|---|---|---|---|---|---|---|---|
| Zero Crossing | VO3062<br>VO3063 | 6-pin DIP or SMD | 5, 10 | 1500 | 5300 | 600<br>800 | -40 to +100 |
| | IL410<br>IL4108 | | 2 | 10000 | | | |
| Non-Zero Crossing | VO3052<br>VO3053 | SOP-4 | 5, 10 | 1500 | 5300 | 600 | -40 to +100 |
| | IL420<br>IL4208 | 6-pin DIP or SMD | 2 | 10000 | | 600<br>800 | -40 to +100 |
| | K30 Series | | 5, 10, 15 | 10 | | 250<br>400 | -40 to +85 |
| Power Phototriac | VO2223<br>VO2223A | 8-pin DIP | 10 | 210 | 5300 | 600 | -40 to +85 |



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# Expansion of 60V StrongIRFET™ Power MOSFET Family

International
IOR Rectifier

**The new expansion of IR's portfolio of 60V StrongIRFET power MOSFETs is available in various standard and performance power packages. The new MOSFETs, which feature ultra low on-state resistance ($R_{DS(ON)}$), are designed for a wide range of industrial applications including power tools, light electric vehicle (LEV) inverters, DC motor drives, Li-ion battery pack protection, and switched mode power supply (SMPS) secondary side synchronous rectification.**

The family of 19 60V StrongIRFET power MOSFETs offers ultra low on-state resistance ($R_{DS(ON)}$) for improved performance in low frequency applications, very high current carrying capability, soft body diode, and 3V typical threshold voltage to improve noise immunity. Each device in the family is 100% avalanche tested at industry highest avalanche current levels to ensure the most robust solution for demanding industrial applications.

Available in thru-hole and surface mount packages, the expanded 60V StrongIRFET family includes the IRF7580M. Housed in a low profile, ultra compact Medium Can (ME) DirectFET® package that delivers high current density while reducing overall system size and cost, the IRF7580M is well suited for space constrained high power industrial designs.

As with the entire DirectFET family, the new IRF7580M Medium Can device has wire bond free construction for improving reliability performance. Moreover, the DirectFET package meets all RoHS requirements such as a completely lead-free bill of materials, and is, therefore, ideally suited for long lifecycle designs.

**60V StrongIRFET Surface Mount**

| Part Number | $B_{VDSS}$ (V) | $I_D$ @ +25°C (A) | $R_{DS(ON)}$ Max @ $V_{GS}$ = 10V (mΩ) | $Q_g$ @ $V_{GS}$ = 10V (nC) | Package |
|---|---|---|---|---|---|
| IRF7580M | 60 | 116 | 3.6 | 120 | Medium Can DirectFET (ME) |
| IRFH7085 | | 100 | 3.2 | 110 | PQFN 5 x 6 (B) |
| IRFR7540 | | 110 | 4.8 | 85 | D-PAK |
| IRFH7545 | | 85 | 5.2 | 73 | PQFN 5 x 6 (E) |
| IRFR7546 | | 71 | 7.9 | 58 | D-PAK |
| IRFS7530-7P | | 240 | 1.4 | 236 | D2-PAK-7 |
| IRFS7534-7P | | | 1.9 | 200 | |
| IRFS7530 | | 195 | 2.0 | 274 | D2-PAK |
| IRFS7534 | | | 2.4 | 180 | |
| IRFS7537 | | | 3.3 | 142 | |
| IRFS7540 | | 110 | 5.1 | 88 | |

**60V StrongIRFET Thru-Hole**

| Part Number | $B_{VDSS}$ (V) | $I_D$ @ +25°C (A) | $R_{DS(ON)}$ Max @ $V_{GS}$ = 10V (mΩ) | $Q_g$ @ $V_{GS}$ = 10V (nC) | Package |
|---|---|---|---|---|---|
| IRFB7530 | 60 | 195 | 2.0 | 274 | TO-220 |
| IRFP7530 | | | | | TO-247 |
| IRFB7534 | | | 2.4 | 186 | TO-220 |
| IRFB7537 | | | 3.3 | 142 | TO-220 |
| IRFP7537 | | | | | TO-247 |
| IRFB7540 | | 110 | 5.1 | 88 | TO-220 |
| IRFB7545 | | 85 | 5.9 | 75 | |
| IRFB7546 | | 58 | 7.3 | 58 | |

## FEATURES

- Designed for industrial applications
- Ultra low $R_{DS(ON)}$
- High current carrying capability, highest in the industry for some packages
- Wide portfolio
- Softer body diode improved performance in low frequency applications
- 3V typical threshold voltage to improve noise immunity

## APPLICATIONS

- Power tools
- Light electric vehicles (LEV)
- Radio controlled toys
- Inverters - solar
- Inverters - back-up (UPS)
- Inverters - mobile (caravan, marine, off-grid)
- DC motors (compressors, pumps, fans, factory automation)
- Li-ion battery protection
- Power supply - secondary side synchronous rectification

## ADVANTAGES

- This family of StrongIRFET devices reaffirms IR's commitment to developing high performance, quality MOSFETs for the industrial market
- The wide portfolio and package offering provide designers flexibility in selecting the most optimal device for their low switching frequency application
- The devices are qualified to industrial grade and moisture sensitivity level 1 (MSL1), and are offered RoHS compliant
- DirectFET devices contain no leaded die attach and are fully compliant with scheduled RoHS restrictions

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# The Latest in Panasonic *Semiconductors!*

### NFC Tag LSI

**NFC LSI with Low Power Consumption and High Security**

Featuring ultra-low power and high security, this series can be used in all near field communication applications. With 4kB of integrated non-volatile FeRAM, the NFC Tag LSI provides fast, robust, and secure data storage.

# Panasonic

Panasonic brings strategic innovations to our customers' product development process. We provide the technology and engineering resources to enable manufacturers to plan and build world-class solutions to meet their customer needs.

- Relays
- Capacitors
- Resistors
- Connectors
- Inductors
- Sensors
- Electromechanical
- Circuit Protection
- RF Modules
- Semiconductors

*...engineering a better world, together.*

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### EKMB & EKMC Series

Passive Infrared Motion Sensors for Smart Home Applications!

((( PaPIRs )))

Panasonic PaPIRs sensors are a fully integrated motion sensing solution, with a low 1µA current consumption. The robust design of the series prevents false detections and increases reliability.

### ADP5 Series

Amplified, Gauge Pressure Sensors with Built-In Temperature Compensation Circuit!

Panasonic pressure sensors provide a high-precision, high-reliability sensing solution for air pressure and water level detection, all within a small 7.0mm (W) x 7.2mm (D) package.

### Touch Key MCU

8-Bit MCU with Built-In Touch Detection Circuit for Touch Sensing Applications!

With the ability to accept inputs from multiple sources, such as single keys, key matrixes, wheels and sliders, the Panasonic Touch Key MCU can be used in a wide array of applications from washing machines to industrial control panels.

High Voltage Ceramic Capacitors for

# Industrial Automation

Power supplies require passive components to lower overall energy consumption, and they must be highly stable to temperature fluctuations as well as support noise suppression. High voltage MLCCs are capable of operating at high voltage levels in devices or equipment for power transmission. Yageo's high voltage ceramic capacitor range exhibits low equivalent series resistance (ESR) at high frequencies, offering an attractive alternative to film capacitors used in power circuits, and our safety certified MLCCs are SC rated high voltage capacitors designed for surge and impulse protection.

**Features**

- Materials: NPO, X7R
- Wide selection of sizes: from 0402 to 1812
- Capacitance range from 0.47pF to 22nF
- Rated working voltage from 100V to 3000V
- High ripple current, low ESR
- Optimized thermal performance
- Long life, high reliability
- Current detection
- Safety approvals (TUV & UL standard certified)

**Recommended Products**

CC1206KKX7RDBB102

CC1206KKX7RCBB103

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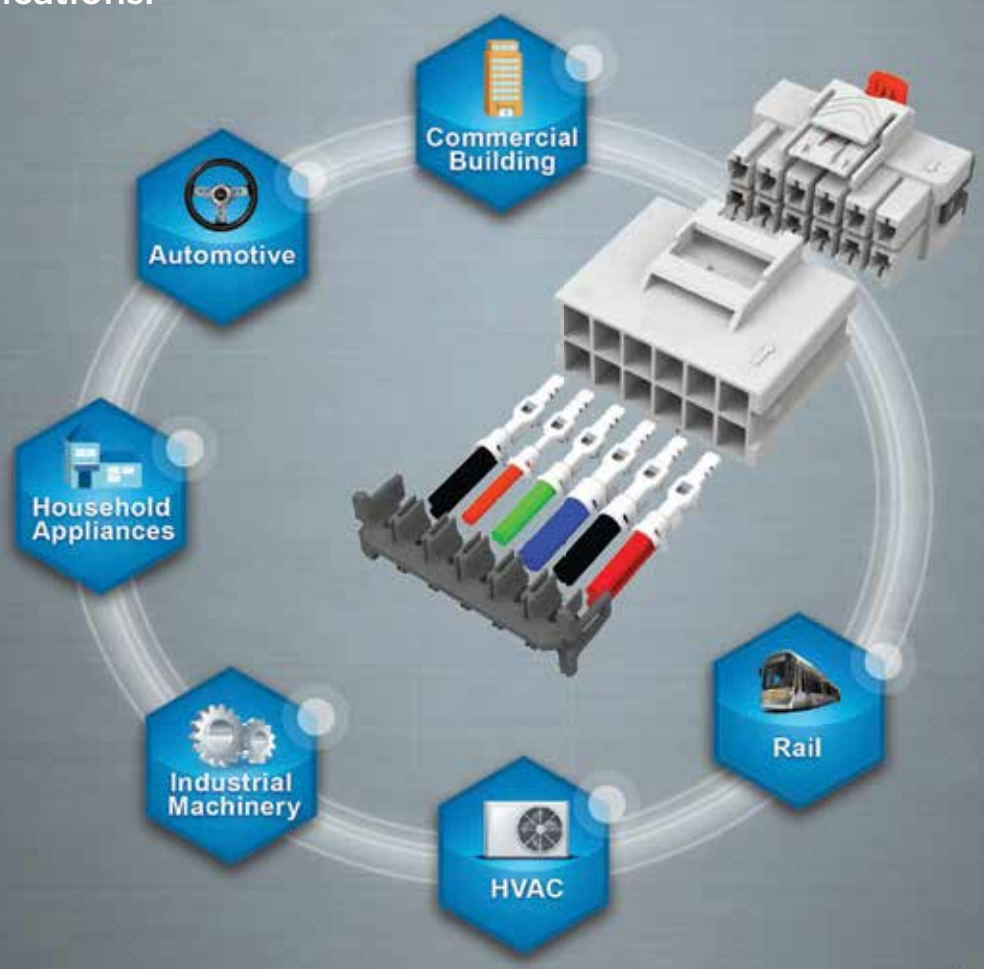
# LOCK IT, POWER ON, EVERY TIME

## NEW POWER TRIPLE LOCK (PTL) CONNECTOR

There is no stopping your design ideas with the connector that offers 3 in 1 reliability every time.

The PTL connector system offers high performance with a functional design.  From the audible lock to the many added customer benefits, the PTL connector system has been specifically developed for better power and signal applications.

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TE connectivity

Authorized Distributor

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# Scalable Spring Fingers for Wearables and PCB Applications

TE connectivity Authorized Distributor

**TE Connectivity (TE) introduces a new line of scalable spring finger products.**

Spring fingers (also known as shield fingers, grounding springs or universal ground contacts) are single contact, surface mountable, internal connectors used in almost every small printed circuit board application. They provide an electrical connection and grounding from EMI noise and static between a PCB and other electronic components such as a secondary PCB, shield can, antenna, or speaker. This new line of products has an enhanced design of the sidewalls to help support operator placement.

TE Connectivity and TE connectivity (logo) are trademarks.

## FEATURES

- Support operator placement with an enhanced sidewall design
- Enable easy design changes with a common footprint used across the family
- Offer design versatility with a broad range of available heights
- Allow an easy and inexpensive method for connecting multiple PCBs
- Prevent EMI noise and static for grounding between device and PCB
- Provide a reliable connection in high vibration conditions
- Accommodate soldering processes using standard pick-and-place equipment

To buy products or download data, go to **www.FutureElectronics.com/FTM**

## APPLICATIONS

- Wearables
- Home electronic devices
- Digital cameras and camcorders
- Business and office equipment
- POS scanners
- Industrial machinery equipment
- Industrial scanners
- Handheld devices
- Thermostats
- Control systems


# Small is Big

**Surface Mount PCB Terminal Blocks Featuring:**

Ultra-low profile

Push-in wire connection

Easy wire release features

**For all your compact controls applications**

**TRY IT FOR FREE...**
**REGISTER TO QUALIFY TO RECEIVE YOUR SAMPLE AT**
**WWW.FUTUREELECTRONICS.COM/FTM**

WAGO®

# PCA9955A 16-Channel Fm+ I²C-Bus 57mA/20V Constant Current LED Driver

**Industrial or home automation system control panels use LEDs for status indicators and for LCD display backlighting. Elegant and user-friendly control panels are a snap to design and cost effective when built around new LED drivers ICs that do more than simply turn those LEDs on and off.**

Controlling an LED directly ties up an MCU IO port pin. In addition, controlling the LED brightness through firmware PWM dimming also ties up the processor. When there's more than just a couple of LEDs in your next user interface design add a dedicated LED driver IC. The latest LED driver from NXP (PCA9955A) requires only two IO port pins for control over the ubiquitous I²C-bus that's built into most MCU ICs. Up to sixteen channels of LEDs can be controlled for ON-OFF or brightness (using PWM). These channels can also be assigned to groups for global dimming; ideal if your control panel is outdoors in both sunlight and moonlight.

A recent addition to these clever LED drivers is the ability to perform gradation – an automatic cycle that controls ramp up and ramp down of LED brightness. This is commonly used to indicate a sleep state when powered down, and only a tell-tale LED is seen 'breathing'.

Registers in this LED driver are easily programmed with 'ramp up', 'hold', 'ramp down' and 'off' durations, so that LED gradation (blinking and breathing) gives the system architect unique signaling options with no burden on the MCU overhead.

For backlighting with a string of LEDs this LED driver IC provides constant current (for better LED matching) and tolerates up to 20V for long strings of LEDs.

Each channel can sink over 50mA with no additional components needed, not even traditional LED ballast resistors. LEDs connect directly to this LED driver IC, which requires only a single global maximum current setting resistor.

More reliable end products result from this LED driver's on-chip fault detector circuitry that reports both open and shorted LEDs.

Finally, with sixteen independently controlled channels, color mixing of RGB LED clusters opens your next control panel design up to end user customization.

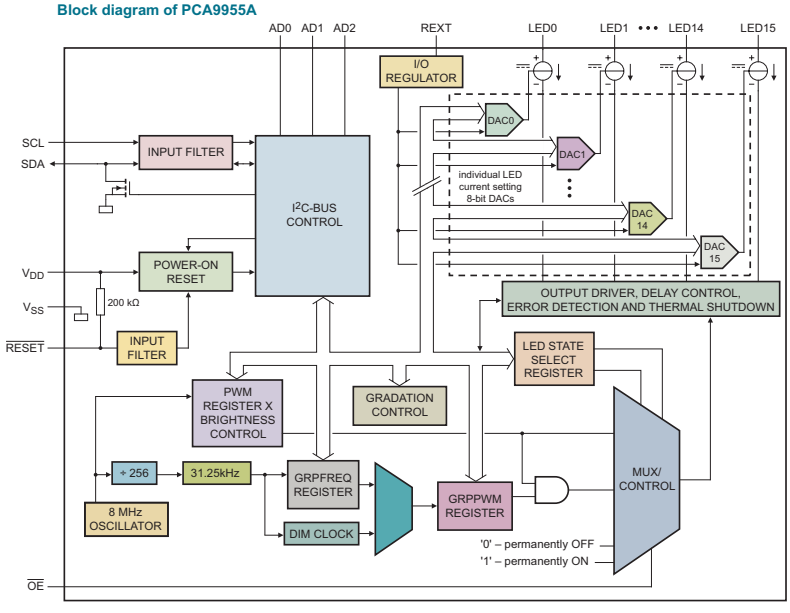
To buy products or download data, go to **www.FutureElectronics.com/FTM**

## APPLICATIONS

- Control panel UI LED status indicators
- Internal service and troubleshooting LED indicators
- "Breathing LED" stand-by indicators
- LCD backlighting
- Keypad backlighting
- RGB or RGBA LED color mixing
- Available in automotive grade (for harsh environments)

| Features | Benefits |
|---|---|
| Gradation control for all channels | Programmable LED "breathing" effect |
| High output drive up to 57mA per channel | Eliminates external FET |
| High output voltage up to 20V per channel | Drive single or string of LEDs per channel |
| LED open or short error detection | Real-time LED monitoring |
| High resolution LED control (8-bit, 256 steps) | Color mixing accuracy |

Block diagram of PCA9955A

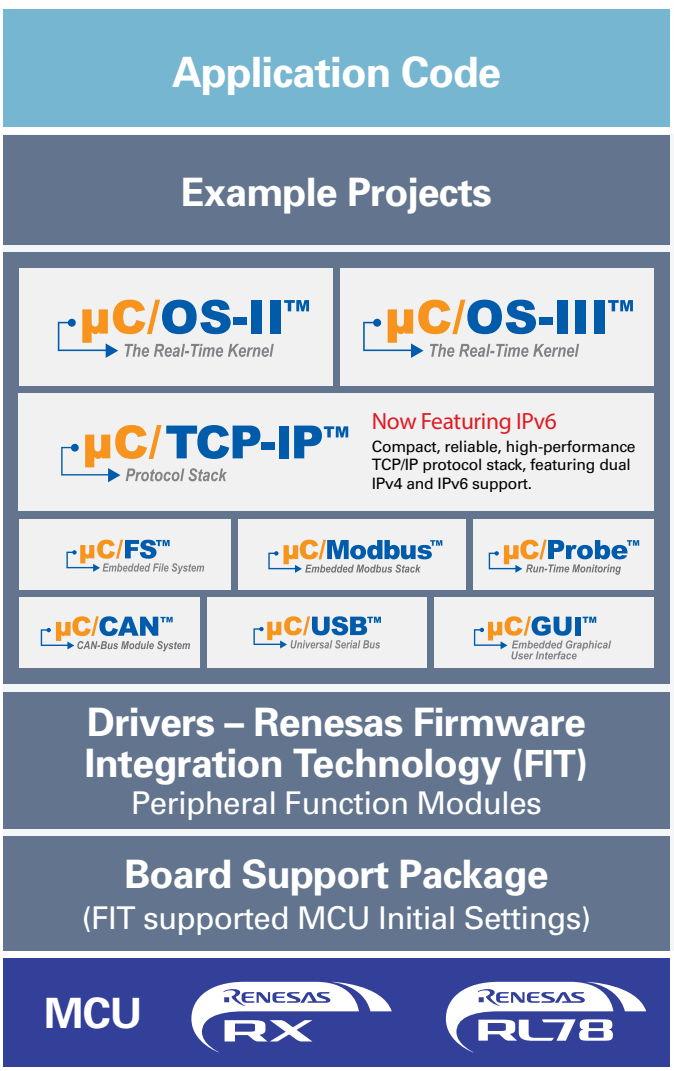


# Work Less. Create More.

Micrium RTOS and middleware modules, bundled with Renesas MCUs, let you bypass the time consuming, expensive and often tedious process of writing infrastructure code – freeing your time and efforts to perfect your design and go on to create new ones.

## Now with IPv6-ready TCP/IP Networking Stacks

"The Power of Two" program is now an even more attractive HW/SW embedded system development solution. With the addition of IPv6, "The Power of Two" now supports Internet of Things (IoT) applications, enabling participants to maximize their RX and RL78 performance for machine-to-machine and cloud communication.




## The Power of Two – Getting You to Market Fast

Start system design at application code level, saving valuable time and resources.

**$111K VALUE!**

- Eliminates months of effort needed to create, test and debug fundamental system code
- Peripheral-rich Renesas MCUs provide superior performance and versatility
- State-of-the-art RTOS and Middleware modules, plus one year technical design support for trouble-free design process
- Example projects that raise the starting point of a design to a higher level
- Renesas FIT modules and Board Support Package

## Get Started Today!

am.renesas.com/micrium/future

the Power of TWO

RENESAS | Micrium | IAR SYSTEMS

With flexibility, customization, and an unparalleled commitment to service excellence, Future Electronics puts the 'different' in differentiators. Being in a unique position as a privately held company, we can offer credit terms, customer dedication and inventory availability like no other distributor in the industry.

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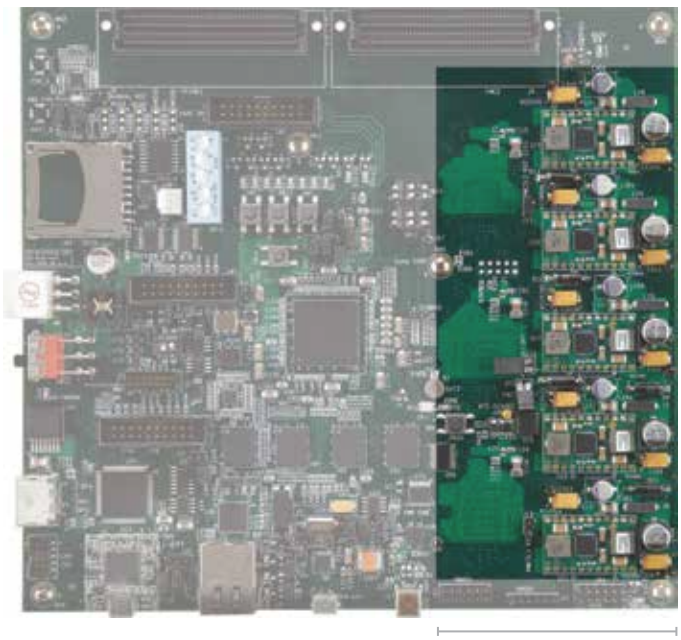
# Exar's Universal PMIC Family

## Programmable Power Solution for Any FPGA or SOC

### Exar's FPGA Power Solution is 90% Smaller with More Functionality

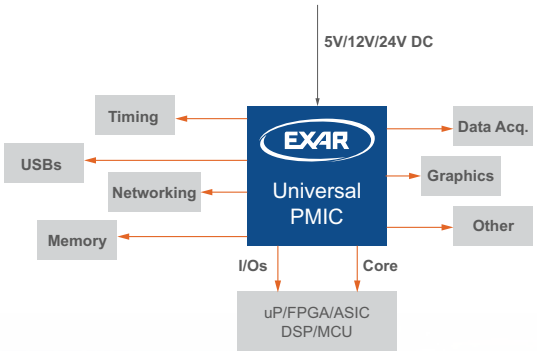



**Ready Made Configurations!**

ZYNQ-7xxx
i.MX5 & i.MX6
SmartFusion2
Cyclone IV
Cyclone V SOC
Intel Wellsburg

**Exar's FPGA Power Solution**

- Customize Your Own PMIC
- Easy-to-Use Design Software
- Reduced Time-to-Market
- 2- to 4-Channels at up to 30A
- Minimal Size & Component Count
- On-Board Non-Volatile Memory
- Power and Status Telemetry
- Dynamic Voltage Scaling
- Remote Re-Configurability




| | XRP7713/14 | XRP7720/24 | XRP9710/11 |
|---|---|---|---|
| Channel(s) | 3 + 2 / 4 + 2 | 4 + 2 | 2 + 1 / 2 + 2 + 1 |
| $V_{IN}$ Range | 4.75V to 25V | 4.75V to 25V | 4.75V to 22V |
| Vo Resolution | 50mV | 2.5mV | 2.5mV |
| Frequency | Up to 1.5MHz | Up to 1.2MHz | Up to 750kHz |
| Non-Volatile Memory | OTP | Flash | Flash |
| High Efficiency Light Load | | √ | √ |
| Integrated Power Stage | | | √ |
| Package (mm) | 5 x 5/6 x 6 | 7 x 7 | 12 x 12 x 2.75 |

EXAR

A New Direction in Mixed-Signal

For more information or to buy products, go to www.FutureElectronics.com/FTM

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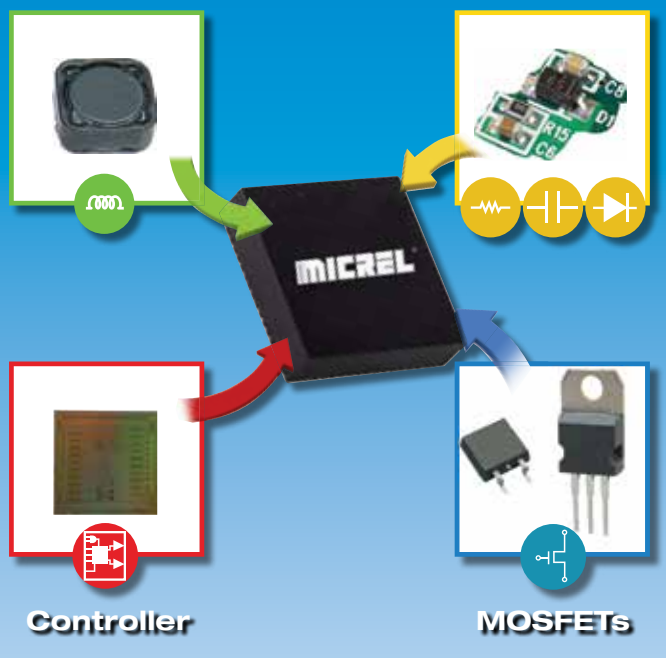
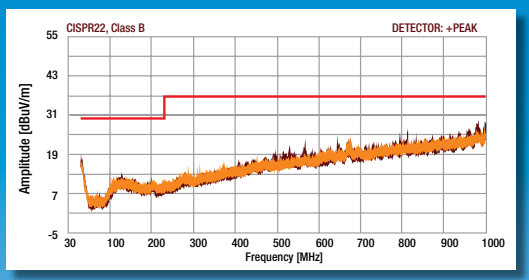
# Integrate Your Power Solution into a Single QFN Package

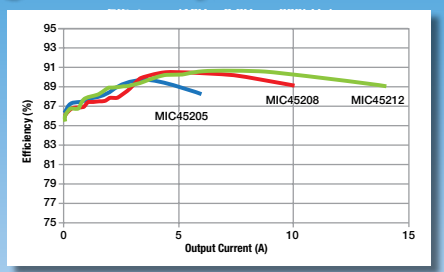
## Small Solution Delivers Big Performance




### Great EMI Performance Meets CISR22 Class B

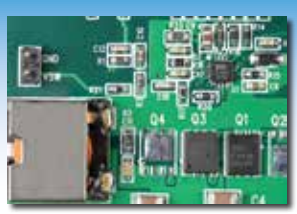


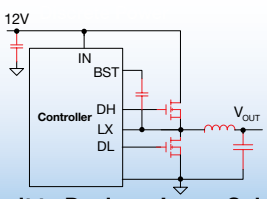

### High Efficiency to Reduce Heat




## Evolve Your Design with Micrel's High Density Module Family

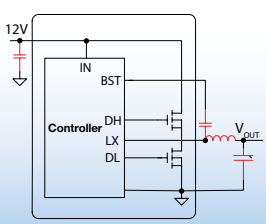
### Discrete Power





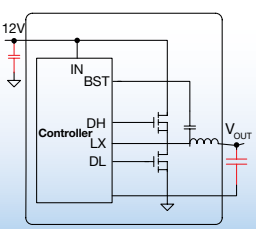

**Difficult to Design • Large Solution**

### Integrated MOSFETs




**Easier to Design • Smaller Solution**

### Power Module




**Easiest to Design • Smallest Solution**

Red = external components

### Commercial
### 2.7V to 5.5V

- Small Size
- Light Load Efficiency
- Low Profile

MIC33163/4 (1A) (2.5 x 3 x 1.1mm³)
MIC33263/4 (2A) (2.5 x 3 x 1.9mm³)

### Networking/Datacom
### 4.5V to 26V

- High Efficiency
- High Power Density
- Fast Load Transients

MIC45205 (6A) (8 x 8 x 3mm³)
MIC45208 (10A) (10 x 10 x 4mm³)
MIC45212 (14A) (12 x 12 x 4mm³)

### Industrial
### 4.5V to 70V

- High Voltage Input
- Meets EMI Standards
- Low Profile

MIC28304 (3A) (12 x 12 x 3mm³)

**For more information or to buy products, go to www.FutureElectronics.com/FTM**

MICREL®
Innovation Through Technology®

# Latest AC/DC Power Supplies Boost Power and Efficiency in Compact Footprint

CUI INC®

**The new VOF series of economical, open-frame AC/DC power supplies are available in 30W, 50W, 70W, and 85W versions, and deliver higher efficiency, improved no-load performance, and 5W extra power within the same footprint when compared to the previous generation.**

Reaching efficiency of up to 90% and with no-load power consumption as low as 0.18W, the VOF-30, VOF-50, and VOF-70 models are rated for operation at 100% load from -20°C to +50°C. The VOF-85 operates at 100% load from -20°C to +40°C.

The power supplies are compact open-frame units measuring just 101.6 x 50.75 x 33.6mm. The VOF-30 models are even smaller, at 90 x 50.8 x 21.1mm. With a universal AC input voltage range of 90V to 277V, at 47Hz to 63Hz, all models offer global compatibility for OEM manufacturers. DC output voltage options include 5V, 12V, 15V, 18V, 24V, 28V and 48V depending on the series. All models include output voltage adjustability of ±5% via an on-board potentiometer.

International approvals include UL/cUL and TUV 60950-1 safety certifications, CE mark, and EN 55022 Class B and FCC Class B EMI standards. Over-voltage, overcurrent and output short circuit protection are built-in, and all models feature high primary to secondary isolation of 3kV AC.

## APPLICATIONS

- Test & measurement equipment
- Industrial equipment
- Networking devices
- Telecom equipment

## FEATURES

- High efficiency
- Low no-load power consumption
- Compact, industry standard footprints
- Chassis mounting style

To buy products or download data, go to **www.FutureElectronics.com/FTM**

# Powering your next design.

**Let us be your power expert.** We understand that you don't have the time to master every aspect of electronic design. As a leading manufacturer of power supplies we are here to collaborate with you to ensure your next project is a success.

*Novum®*
*Advanced Power*

*Ac-Dc*
*Power Supplies*

*Dc-Dc*
*Converters*

CUI INC®

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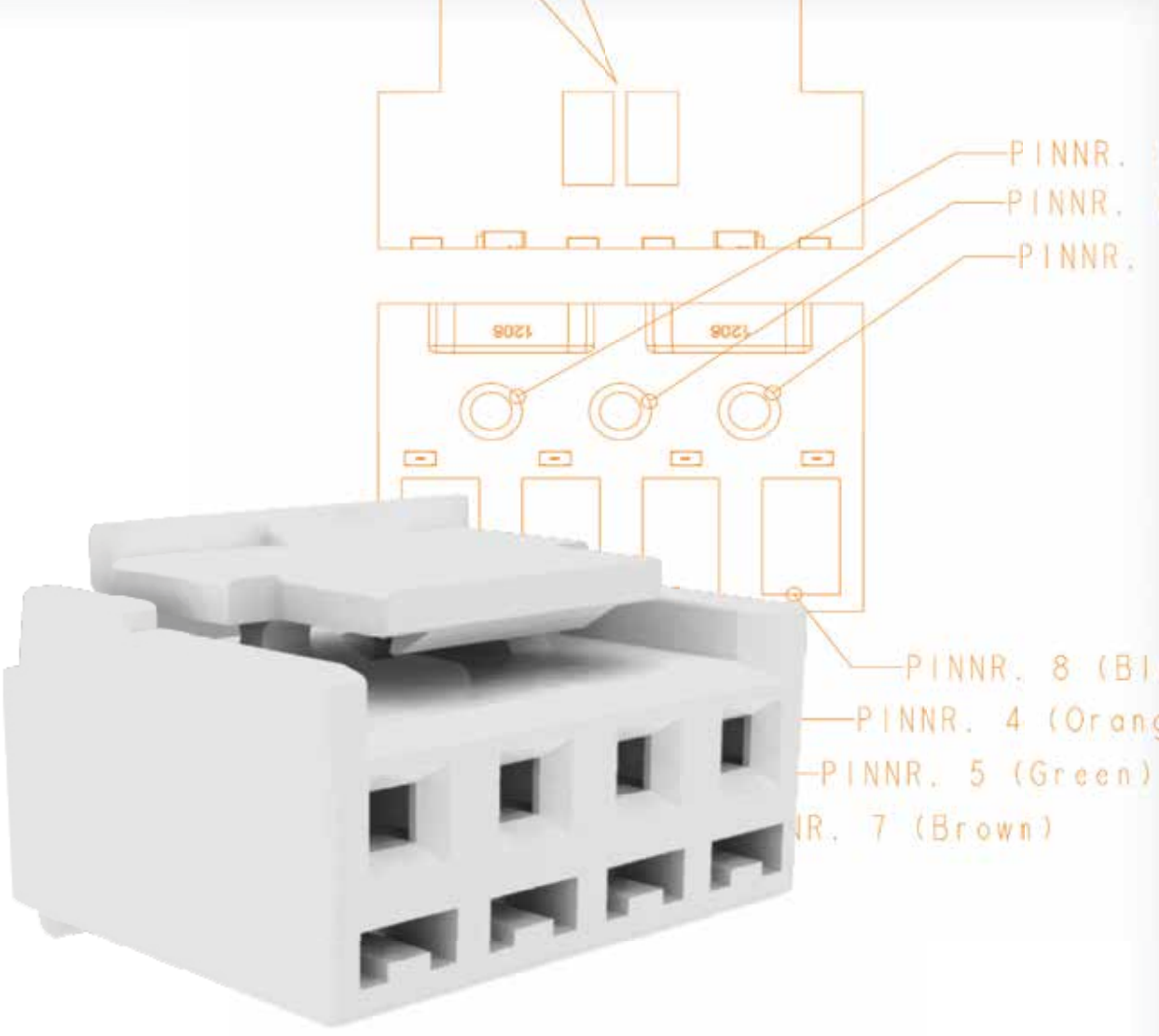


# CONNECT WITH CONFIDENCE

TE Connectivity's Economy Power (EP) II connectors offer two levels of mechanical and electrical reliability: a true locking latch helps prevent the plug housing and post header from vibrating apart, while a snap-in Terminal Position Assurance (TPA) device helps assure that receptacle contacts are fully seated and helps prevent their backing out. Compared to original EP connectors, EP II connectors have considerably increased electrical ratings. At up to 600VAC and up to 11.5A of current, the connectors can be used throughout industrial and home automation applications.

**For more information or to buy products, go to FutureElectronics.com/FTM**

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# SL Power Solves Test & Measurement Power Challenges with TU425 AC/DC Power Supply Family

**The new 425W TU425 series AC/DC power supply offers superior EMC/EMI compliance, RF and surge immunity.**

This new series addresses the unique needs of all types of test equipment such as oscilloscopes, analyzers, test boards, chromatography mass detectors, as well as industrial process control systems that require clean, reliable power for the highest level of performance.

Feature rich and highly efficient, up to 90%, the TU425 product family with active current share for redundant applications, measures only 3 x 6.2 x 1.62 inches, easily fitting into a compact 1U high chassis and provides 300W of convection cooling or 425W with moving air.

Designed with the highest level of electromagnetic compatibility (EMC) and electromagnetic interference (EMI) protection, the TU425 model features a wide -10°C to +70°C operating temperature range and will start-up at a low -40°C, providing optimum thermal performance and eliminating the need for a costly heating element.

The TU425 power supply features over 350,000 hours Mean Time Between Failure (MTBF) and uses long life (>7 years) electrolytic capacitors in its design.

They also feature a universal input of 90Vac to 264Vac and are available in outputs of 12V, 18V, 24V, 48V and 56V. Input and output monitoring alarms plus isolated 12V/1A fan output and 5V/2A stand-by voltage are standard offerings of TU425 family.

## APPLICATIONS

- Oscilloscopes
- Analyzers
- Test boards
- Chromatography
- Industrial process control systems

To buy products or download data, go to **www.FutureElectronics.com/FTM**

TU425

## FEATURES

- 3.3 x 6.2 x 1.62 inch package
- Up to 425W of air-cooled power, 300W convection
- Universal input 90Vac to 264Vac input range
- 5V at 2A isolated stand-by output
- Isolated 12V fan output
- Inhibit, power fail, DC OK signals, remote sense
- Approved to CSA/EN/IEC/UL60950-1, 2nd edition
- Compliant to high levels of EMC per EN61000-4
- Meets Class B conducted EMI with 6db margin, Class A radiated EMI with 3db margin
- Efficiency 90% typical
- 3 year warranty

# Control the Signal You Send

**With design, production and support locations around the globe, TE Connectivity (TE) is one of the world's leading relay manufacturers. TE has a long history of expertise in signal relays supported by well-known brands, and offers a wide variety of 2nd and 3rd generation signal relays to meet low current switching requirements with cost effective, low profile designs.**

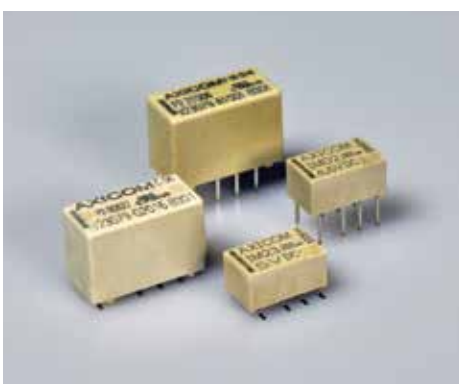
Ideal for small spaces, these compact relays are designed to switch signal-level loads in applications such as communications systems, test gear, thermostats, instrumentation, consumer electronics, intelligent buildings and industrial equipment. Engineered to switch maximum currents up to 5A, these relays usually switch only mA in application. These relays typically have relatively low operate and release times compared to general purpose relays. Most are sealed, and some offer surface mount terminals.

## FEATURES

- Typically 2 form C
- 2A/5A rated current
- High contact reliability (ensured by bifurcated contacts)
- Low contact resistance
- 50mW to 200mW coil power, often also bistable (latching) versions
- SMT design for reflow soldering is common

## APPLICATIONS

- Network, modems, test access matrix
- RF: wireless infrastructure, antenna switching, high speed routers
- Computer, printer, fax interface, IP phones
- Thermostat, emergency lighting, fire and security control, elevator control
- Hands-free speaker switch, door module, CAN Bus
- Medical ultrasonic equipment



To buy products or download data, go to **www.FutureElectronics.com/FTM**

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HARTING®

Pushing Performance

We have your solution
**DIN 41 612 connectors**

## Time-tested and still evolving

- With 40 years of development, HARTING's market leading connectors offer solutions for today.
- Reduced size with one third length versions, mixed contact types with hybrid connectors.
- Rugged shell housings address the most demanding applications.
- Specially loaded variants deliver solutions customized to your need.

**For more information or to buy products, go to www.FutureElectronics.com/Harting**

**People | Power | Partnership**

# 0.01%, 2ppm (TCR) and Unmatched Reliability

SUSUMU

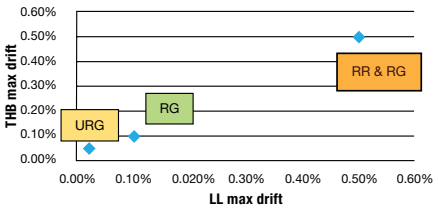
**Susumu's RG series, the best performing and most reliable thin film chip resistors in the market have gotten even better. The new URG series offers significant improvement in reliability as well as TCR linearity.**

### Electrical Characteristics

The URG series, like its cousin RGLL, boasts the industry's best absolute tolerance ±0.01%, and smallest TCR ±2ppm/°C, as thin film chip resistors. Because it is made of thin film, it maintains all the thin film advantages such as low noise (-25dB to -35dB) and frequency performance (up to 1GHz). In addition, the URG series shows superb linearity in TCR as shown.

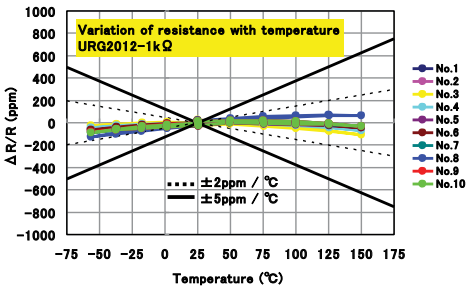
Package size: EIA standard 0603, 0805 and 1206

**Temperature Humidity Bias and Load Life**




### Reliability

The RG series has excellent reliability and the URG's reliability is even better. For example, the maximum drift for load life (+70°C, 2000 hours) is specified as ±0.02% (RG ±0.05%), the humidity bias (85/85, 2000 hours) drift is specified as ±0.05% (RG ±0.1%, refer to the graph), the temperature cycle drift (-65°C/+150°C, 100 cycles) is specified as ±0.02% (RG ±0.1%), and the high temperature exposure (+155°C, 100 hours) drift is specified as ±0.02% (RG ±0.1%). The URG series is also highly stable under any environmental conditions including sulfuric atmosphere.




For applications that require extreme precision and reliability such as precision industrial instrumentation, test and measuring instrumentation, automotive electronics, and laboratory grade scales, now you have a choice among Susumu's highly precise and highly reliable resistor trio: RG-PV (0.02%, 5ppm), RG-LL (0.01% 2ppm), and the most advanced URG series (0.01%, 2ppm + ultra reliability).

To buy products or download data, go to **www.FutureElectronics.com/FTM**

# E-Switch™ Offers Switch Solutions for Home and Industrial Automation Products

## Sealed Switches

E-Switch's sealed tact, anti-vandals, push-button and rocker switches have ratings up to IP67. We also offer process sealed switches.

## Illuminated Switches

E-Switch's illuminated switches offer many options including multiple colors, RGB, dual-LED and more.

## Power Rated Switches

E-Switch's power rated rocker switches are rugged enough to pass the test, allowing up to 20A of power, along with HP ratings.

With a robust line of switch products, from rockers and toggles, to push-button and tact switches, E-Switch has the solution for your application.

**For more information or to buy products, go to www.FutureElectronics.com/FTM**

# Combat Harsh Environments with Rugged Toggle Switches

**For design engineers, every harsh environment presents its own set of challenges stemming from a host of factors, such as extreme temperatures, water, chemicals, dust, oil and other types of contaminants.**

Rated at IP67 of IEC60529 standards, NKK's S Series gives design engineers the ability to incorporate a reliable toggle switch into designs that can be used in a variety of rugged environments. The standard bat-style actuator models also feature an optional splash-proof boot to cover the base of the actuator for additional sealing to guard against dangerous contamination.

All S Series switches feature solder lug terminals and are panel mount with 12mm threaded bushings. The series' mounting design conforms to standard panel cut outs with electrical capacities ranging from 15A to 20A at 125VAC, 6A to 10A at 250VAC and 15A to 20A at $30V_{DC}$.

The S Series is available with or without locking levers, the 17.5mm toggle switches feature many circuit configurations, including SPST, SPDT, DPST and DPDT, with a choice of momentary or maintained circuits. Locking levers can be specified for maintained circuits and standard hardware includes a hex nut, lock washer and an O-ring for panel sealing. In addition, engineers have the option of specifying 0.250" quick connect terminals and ON/OFF inscribed plates.

NKK has the products and the technical expertise to help engineers choose the right switch for today's harsh environment applications. NKK offers free 3D CAD models, free switch samples and custom switch solutions, allowing engineers to take their designs to the next level!

## FEATURES

- Low/medium/high capacity
- Variety of splashproof boots
- Mechanical life 30,000 to 50,000 operations minimum
- Electrical life 25,000 operations minimum
- IP-rated models available

## APPLICATIONS

- Industrial equipment
- Heavy machinery
- Construction equipment
- Transportation vehicles
- Aircraft
- Automotive
- Outdoor concert and lighting equipment
- Portable power tools
- Telecommunication devices

To buy products or download data, go to **www.FutureElectronics.com/FTM**

## NKK Switches offers a full range of switch devices for your toughest environments.

Our industrial and IP-rated switches include electrical ratings from 3A to 50A and meet all IEC standards from IP60 to IP67. Splashproof boots are compatible with NKK's toggle and pushbutton switches and provide an additional level of protection against contaminants. Engineers turn to NKK Switches for peace of mind that no matter what the environmental conditions, actuation will occur every time and without fail.

For more information or to buy products, visit **www.FutureElectronics.com/FTM**

# Quad SPI Flash: A Simpler, Faster Alternative to Standard SPI Flash When Adding External Memory to 32-bit MCU Systems

By: Frederik De Swaef, Field Applications Engineer, Macronix and Francesco Petruzziello, MCU Product Application Engineer, NXP

**The modern 32-bit microcontroller is a remarkably capable device, but its abilities have given rise to a problem for the design engineers who use them; faced with ever-growing demand for more features, such as more detailed graphics or a greater range of languages to be supported in the user interface, designers are finding themselves limited by the small size of the typical MCU's on-chip Flash memory.**

Today, 32-bit MCUs are normally supplied with an on-chip Flash memory no larger than 1Mb. And the options for extending this on-board memory have changed in recent years; it is now rare to add external parallel Flash, since few MCUs support the parallel external memory interface. One of the reasons for this lack of support is the number of pins a parallel Flash needs for a 8- or 16-bit data bus and 20 or more address and control lines.

SPI NOR Flash is another option that the design could consider, but this memory type is much slower than on-chip and parallel Flash. Further, it is normally impossible to execute code from SPI Flash; even if it is possible, the performance is poor.

To solve this problem of adding external Flash memory, NXP Semiconductors has developed a new, easy-to-use external memory interface. Called SPI Flash Interface (SPIFI), it is intended for use with the popular Quad SPI NOR Flash memory type, which is cost effective and provides a wide choice of densities.

SPIFI is available today in the LPC1800 family of ARM® Cortex®-M3 MCUs from NXP, and in the LPC4000 and LPC4300 families of ARM Cortex-M4MCUs. (SPIFI support will be added to more NXP MCUs, in future). SPIFI support means that these controllers can benefit from the proven Quad SPI memory technology provided by the MX25 range of Serial NOR Flash devices from Macronix. These range in size from 8Mb to 512Mb, and are suitable for both fast data storage and in-place code execution.

Quad SPI is a modified serial peripheral interface which is capable of communicating on four data lines; traditional SPI uses only a single line. This multiplies the data throughput by almost four times, and makes high-performance execution in place possible. Compared to parallel NOR Flash with a 16-bit data bus, Quad SPI NOR Flash can achieve almost twice the total throughput (see Figure 1).

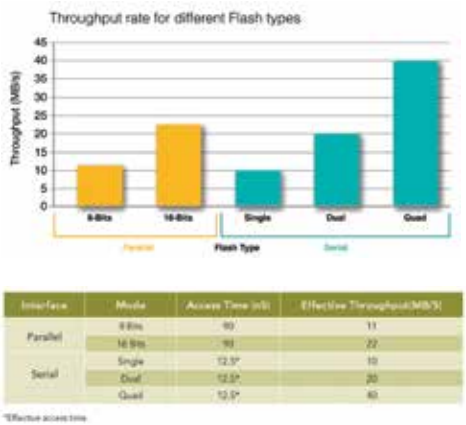



Figure 1: Quad SPI NOR Flash offers throughput nearly two times greater than that of parallel NOR Flash

Throughput is not Quad SPI's only advantage; requiring only six connections between the MCU and the memory IC, routing is far less complex than that of a parallel Flash design, which calls for between 30 and 45 tracks.

### Macronix Quad SPI Flash choices

The MX25 series of Quad SPI Flash memories from Macronix is available in various small 8- and 16-pin packages. These SOP, WSON and USON devices have a very small board footprint. Macronix has taken care to give various MX25 devices of different memory densities the same footprint or a compatible footprint, so that OEMs can migrate from one density to another without making any changes to board layout. Only when migrating to a density higher than 128Mb does the designer have to implement minor software changes to support 4-byte addressing.

In NXP MCUs, the SPIFI interface is directly connected to the ARM core's AMBA High performance Bus (AHB), which means that the Quad SPI Flash is mapped and accessible for transfer via I/O or DMA channels (see Figure 2). When executing in place, instructions are loaded into the SPIFI buffers directly from the external Flash, with no software overhead.

The Quad SPI Flash itself is controlled by five registers. These registers set the configuration and commands for reading and retrieving status information, and are transparently used by the on-chip ROM driver and the SPIFI library. They can also be directly accessed by the user application if desired.

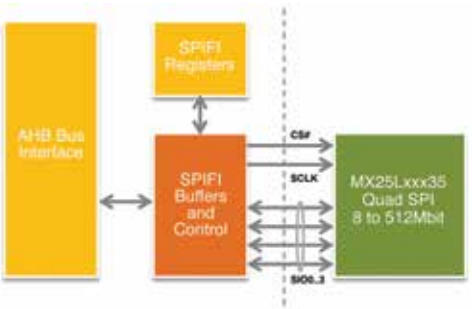



Figure 2: The Quad SPI Flash memory is directly connected to the AHB via SPIFI

The MCU's SPIFI hardware controls the process for reading from the Quad SPI Flash. If code is stored there, the hardware will fetch it automatically in accordance with the register settings, with no software intervention. Initiation of writing and erasing operations is controlled by software settings.

The commands for data transfer have the same structure as those of a conventional SPI Flash memory; they specify the command, address and data for reading and writing (see Figure 3). With Quad SPI Flash, the command will be sent on one line, and the address on four lines. Data are also moved from Flash on four lines. The use of four lines means that sending a 24-bit or 3-byte address requires only six clock cycles, instead of 24 in an SPI Flash memory. Similarly, 1 byte of data is received in two clock cycles instead of eight.

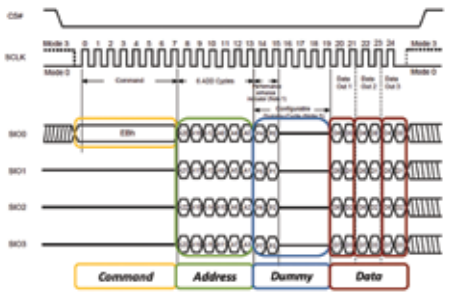



Figure 3: The Quad SPI Flash command structure is similar to that of conventional SPI Flash

The Macronix MX25 Flash memories are capable of running at a clock frequency up to 104MHz during all operations. For read operations, the designer must take into account the need for dummy cycles after transferring the address when calculating the access time required to fetch the first byte. After the first byte, the address will automatically be incremented and data will be sent out with no additional access time until the Select pin goes high again. This enables a fast data throughput when reading sequential data.

Random read operations, such as branching in instructions, must use the Enhanced Read mode. This mode enables data to be read without sending a Read command. The address alone needs to be provided, saving eight clock cycles. The Enhanced Read mode is set by toggling bits in the dummy cycles of the first read operation. All subsequent reads only need to transmit the address.

### NXP MCUs' Support for Quad SPI Flash

Some NXP ARM Cortex-M MCUs have no on-chip Flash memory. This includes the LPC1810, LPC1820, LPC1830 and LPC1850, and also the LPC4310, LPC4320, LPC4330, LPC4350 and LPC4370. All these devices, however, can use external Quad SPI Flash as their sole non-volatile memory for data and code storage and for in-place execution, enjoying outstanding read and write performance.

The Macronix MX25Lxxx35E/F series is ideal for this, offering densities from 8Mb to 512Mb (64MB) in 8-pin or 16-pin packages (see Table 1).

| Density | MXIC type | Part number | Package |
|---|---|---|---|
| 8Mb | MX25L8035E | MX25L8035EM2I-10G | 8-SOP |
| 16Mb | MX25L1635E | MX25L1636EM2I-08G | 8-SOP |
| 32Mb | MX25L3235E | MX25L3235EMI-10G | 16-SOP |
| | | MX25L3235EM2I-10G | 8-SOP |
| | | MX25L3235EZNI-10G | 8-WSON |
| 64Mb | MX25L6435E | MX25L6435EMI-10G | 16-SOP |
| | | MX25L6435EM2I-10G | 8-SOP |
| | | MX25L6435EZNI-10G | 8-WSON |
| | | MX25L6435EZ2I-10G | 8-WSON |
| 128Mb | MX25L12835F | MX25L12835FM2I-10G | 8-SOP |
| | | MX25L12835FMI-10G | 16-SOP |
| | | MX25L12835FZ2I-10G | 8-WSON |
| | | MX25L12835FZNI-10G | 8-WSON |
| 256Mb | MX25L25635F | MX25L25635FMI-10G | 16-SOP |
| | | MX25L25635FZ2I-10G | 8-WSON |
| 512Mb | MX25L51235F | MX66L51235FMI-10G | 16-SOP |
| | | MX66L51235FZ2I-10G | 8-WSON |

Table 1: Macronix offers a broad choice of Quad SPI NOR Flash memories

The designer has the flexibility to migrate during development without being tied to one density, while benefiting from high performance combined with a very low bill of materials cost.

SPIFI is also implemented in LPC MCUs which do feature on-chip Flash. In this case, the function of the Quad SPI external Flash is to extend the on-chip memory, providing extra code- or data-storage capability.

This is often required in graphical user interfaces (GUIs). Traditionally in these applications, the image data are stored in an external SPI or parallel Flash, with the disadvantages described above. Data often need to be shifted from the external device into internal or external RAM, and then moved again to the display itself. This means that the data have to be moved twice before being displayed.

The high throughput of the MX25 Quad SPI Flash and the memory-mapped SPIFI interface allow data to be shifted directly from external Flash to the display. Now, the data are moved only once and the amount of RAM needed as well as the memory bus load can be markedly reduced.

### Conclusion

When a 32-bit MCU has no on-chip Flash memory, or its on-board Flash is not large enough, the ideal solution is to add a Quad SPI external Flash memory. Quad SPI Flash supported by the SPIFI interface implemented in NXP ARM Cortex-M MCUs removes the complexity of designing with external parallel Flash, reducing pin count and offering better performance. This makes the combination a good choice for many applications in industrial equipment, consumer devices and white goods.

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## Analog Signal Chain

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### ISL28022: Precision Digital Power Monitor

The ISL28022 is a bi-directional high side and low side digital current sense and voltage monitor with serial interface. The device monitors current and voltage and provides the results digitally along with calculated power. The ISL28022 provides tight accuracy of less than 0.3% for both voltage and current monitoring over the entire input range. The digital power monitor has configurable fault thresholds and measurable ADC gain ranges.

**FEATURES**

- 0V to 60V bus voltage sense range
- <0.3% voltage and current measuring error
- Over-/under-voltage and current fault monitoring
- 3V to 5.5V $V_{CC}$ range
- Supports 3.4MHz high speed $I^2C$
- 16-bit ∑ΔADC monitors current and voltage
- Handles negative system voltage
- $I^2C$/SMBus interface
- 8kV ESD (HBM)
- 1k MSRP: starts at $0.95

MICROCHIP

### MCP6N16: Zero-Drift Instrumentation Amplifier Provides Low Power and High Accuracy

The MCP6N16 is a single zero-drift instrumentation amplifier (INA) with enable pin (EN) and three minimum gain options (GMIN). The self-correcting architecture maximizes DC performance by enabling ultra low offset, low offset drift, and superior common-mode and power supply rejection, while eliminating the adverse effects of 1/f noise. The low power operation and shutdown capability requires less current for the given speed and performance, which extends battery life and leads to less self heating.

**FEATURES**

- ±17 µV VOS
- 1.8V to 5.5V supply voltage
- 500kHz bandwidth
- Rail-to-rail input and output
- Gain set by two external resistors
- 112dB CMRR
- 1.1mA Iq
- 1, 10 and 100V/V minimum gain options
- 8-pin MSOP and 3 x 3mm DFN packages
- 5k MSRP: $1.52

## Power Regulation, Conversion and Management

EXAR

### XR75100: 40V Synchronous Step Down COT Controller Simplifies Point-of-Load Supply Designs

The XR75100 is a synchronous step down controller for point-of-load supplies up to 20A. A wide 5V to 40V input voltage range allows for single supply operation from industry standard 12V, 18V, and 24V DC and AC rails. The patented emulated current mode Constant On-Time (COT) control scheme provides extremely fast line and load transient response using ceramic output capacitors. It requires no loop compensation hence simplifying circuit implementation and reducing overall component count.

**FEATURES**

- 20A capable step down controller
- Integrated high current 2A/3A drivers
- No loop compensation required
- Ceramic output capacitor stable operation
- Constant 100kHz to 800kHz frequency
- Programmable current limit
- 5.5V to 40V input voltage range
- 0.6V adjustable output voltage
- <0.01%/V line regulation
- Programmable 200ns-2µs on-time
- Selectable CCM or CCM/DCM operation
- 1k MSRP: $1.59

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### IRS29831: Highly Integrated LEDrivIR™ Control IC Optimized for Single Stage Flyback and Buck-Boost Topologies

Employing accurate primary side power regulation, the IRS29831 integrates an LED driver control IC and power MOSFET utilizing 700V technology and features high voltage start-up to offer a simple cost effective single stage solution while maintaining a high power factor and low Total Harmonic Distortion (THD) for improved efficiency. IRS29831-based LED driver circuits also offer smooth, flicker-free dimming with triac based dimmers. Protection features include hiccup mode open-load/ over-voltage protection, cycle-by-cycle primary overcurrent limiting, and output short circuit protection.

**FEATURES**

- Integrated 700V MOSFET
- Burst mode operation at light load
- 150µA micro power start-up
- 2.5mA quiescent current
- Compatible with triac dimmers
- Critical-conduction/transition mode operation
- Overcurrent protection
- Latch immunity and ESD protection
- Open load/over-voltage protection
- 10k MSRP: $1.25

## Power Regulation, Conversion and Management

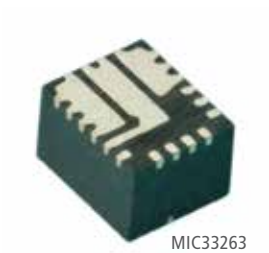
intersil

### ISL78113A: High Efficiency Synchronous Boost Converter with 1.3A Switch

The ISL78113A provides a tiny and convenient boost power supply solution to generate a regulated output up to 500mA from any sub-5V secondary rail found in an automotive electrical system, including battery-powered applications (NiCd, NiMH, or one-cell Li-Ion/Li-Polymer). It offers an adjustable output (3.0V to 5.2V) supporting USB-OTG or HDMI applications. The device is able to supply 500mA from a 3V input and 5V output, and has a typical 1.3A peak current limit.

**FEATURES**

- 0.8V to 4.7V input voltage range
- <1µA shutdown current
- Output disconnect during shutdown
- OVP, OCP, OTP, UVLO fault protection features
- Qualified for automotive operations
- Up to 500mA output current
- 2MHz switching frequency
- Up to 95% efficiency at typical operating conditions
- 2 x 2mm 8-lead DFN package

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### MIC33163/263: 4MHz Buck Regulator Modules with HyperLight Load® and Power Good

The MIC33163/263 is a highly efficient synchronous buck regulator with integrated inductor which provides the optimal trade-off between footprint and efficiency. The 100% duty cycle and HLL mode of operation delivers very high efficiency at light loads and ultra-fast transient response which makes the MIC33163/263 perfectly suited for any space constrained application and a great alternative for low dropout regulators. An additional benefit of this proprietary architecture is very low output ripple voltage throughout the entire load range with the use of small output capacitors.

**FEATURES**

- Up to 93% peak efficiency
- 33µA quiescent current
- 85% typical efficiency at 1mA
- 4MHz PWM operation in continuous mode
- 0.7V to 5V adjustable output voltage
- 1A/2A output current
- Low output voltage ripple
- Ultra-fast transient response
- Low radiated emission (EMI) per EN55022, class B
- Configurable soft start with pre-bias start-up capability

MICROCHIP

### MCP16331: 50V Integrated Step Down Regulator

The MCP16331 is a highly integrated, high efficiency, fixed frequency, step down DC-DC converter that operates from input voltage sources up to 50V. Integrated features include a high side switch, fixed frequency peak current mode control, internal compensation, peak current limit and over-temperature protection. Minimal external components are necessary to develop a complete step down DC-DC converter power supply.

**FEATURES**

- Up to 96% efficiency
- 4.4V to 50V input voltage range
- 2.0V to 24V output voltage range
- Minimum 500mA output current
- Internal soft start
- 2% output voltage accuracy
- 500kHz fixed frequency
- Adjustable output voltage
- 6µA shutdown current
- 6-lead SOT-23 and 8-lead 2 x 3 TDFN packages

## Sensors

DAEC™ Dynamic Angle Error Compensation
- High resolution for motor & position control
- Easy to use – saving costs on DSP
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### AS5047D/5147: Magnetic Position Sensors Enable Best Accuracy at High Rotation Speeds

With DAEC™ (Dynamic Angle Error Compensation), a patent-pending technology developed by ams, the AS5047D/5147 rotary position sensors eliminate the measurement error attributable to propagation delay. The resulting error increases in a linear fashion with increases in the speed of rotation; the 47 series sensors provide angle measurements accurate to ±0.08° at 7,000rpm, to ±0.14° at 12,000rpm and to ±0.17° at 14,500rpm.

**FEATURES**

- 14-bit core resolution
- 14,500rpm maximum speed
- Independent output interfaces: SPI, ABI, UVW, PWM
- Self-diagnostics
- AEC-Q100 qualified (AS5147)
- ABI programmable decimal and binary pulse-count
- Zero position, configuration programmable
- Immune to external stray field
- 14-pin TSSOP package
- 1k MSRP: $4.21/$4.84

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